1. Find $\lim_{x\to\infty} \frac{x+1}{x^2+3}$.

A) 0

B) 3/16

C) 5/16

D) 1/3

E) 2/3

F) 7/8

G) 15/16

H) 1

I) 2

J) None of the above.

2. For what set of x is the function $f(x)=\frac{\cos x}{x}$ continuous?

A) $(-\infty, \infty)$

B) For all x except $x = 0$

C) $(0, \infty)$

D) $(-\infty, 0)$

E) For all x except the even multiples $\pm 2k\pi$ of π

F) For all x except the multiples $\pm k\pi$ of π.

G) $(0, \pi)$

H) $(-\pi, \pi)$

I) (0, 1)

J) None of the above.

3. Let $r = \frac{e^s}{s}$. Find $\left.\frac{dr}{ds}\right|_{s=1}$.

A) 0

B) 3/16

C) 5/16

D) 1/3

E) 2/3

F) 7/8

G) 15/16

H) 1

I) 2

J) None of the above.

4. Let $f(x) = 4 - x^2 \sin x$. Find $f'(0)$.

A) 0

B) 3/16

C) 5/16

D) 1/3

E) 2/3

F) 7/8

G) 15/16

H) 1

I) 2

J) None of the above.

5. Let $y=(2x+1)^5$. Find $\frac{dy}{dx}$.

A) $(2x+1)^4$

B) $5(2x+1)^4$

C) $10(2x+1)^4$

D) $x(2x+1)^5$

E) $x(2x+1)^4$

F) $5x(2x+1)^4$

G) $10x(2x+1)^4$

H) $2(x+1)^5$

I) $2(x+1)^4$

J) None of the above.

6. Suppose x and y are related by the equation $2xy + y^2 = x + y$. Use implicit differentiation to find $\frac{dy}{dx}$ as a function of x and y.

A) $1 - 2y$

B) $2x + 2y + 1$

C) $1 + 2y$

D) $2x + 2y - 1$

E) $\frac{1-2y}{2x+2y-1}$

F) $\frac{2x+2y-1}{1-2y}$

G) $\frac{1+2y}{2x+2y+1}$

H) $\frac{2x+2y+1}{1+2y}$

I) $\frac{x+y}{1+2x}$

J) None of the above.

7. Let $f(x) = \frac{x^4}{4}\ln x - \frac{x^4}{16}$. Find $f'(x)$.

A) 0

B) $\frac{x^3}{4}$

C) x^3

D) $\frac{x^3}{4} - \frac{x}{16}$

E) $x^3 \ln x - \frac{x^3}{4}$

F) $x \ln x - x^3$

G) $x \ln x - \frac{x^3}{2}$

H) $x^4 \ln x$

I) $x^3 \ln x$

J) None of the above.

8. A 13-foot ladder is leaning against a house when its base starts to slide away from the wall. By the time the base of the ladder is 12 feet from the house, it is moving out at 5 feet per second. At that instant, how fast (in feet per second) is the top moving down the wall?

A) 0

B) 1

C) 2

D) 5

E) 9

F) 10

G) 12

H) 15

I) 17

J) None of the above.

9. Find the absolute minimum value taken on by the function $f(x)=\sqrt{4-x^2}$ on the closed interval [-2, 1].

A) $-\sqrt{3}$

B) -2

C) 0

D) 1

E) 2

F) $\sqrt{2}$

G) $\sqrt{3}$

H) 4

I) There is no absolute minimum on the interval.

J) None of the above.

10. Find all critical points of the function $f(x) = 2x^2 - x^3$. (x =)

A) 0

B) 2

C) 0 and 2

D) -2 and 0

E) 4/3

F) 3/4

G) 0 and 4/3

H) 3/4 and 4/3

I) 4/3 and 2

J) None of the above.

11. Find $\lim_{t\to 0}\frac{\sin\left(t^2\right)}{t}$.

A) 0

B) 3/16

C) 5/16

D) 1/3

E) 2/3

F) 7/8

G) 15/16

H) 1

I) 2

J) None of the above.

12. Find $\int x^{-1/3}\,dx$.

A) $-\frac{1}{3}x^{-\frac{2}{3}}+C$

B) $x^{-\frac{3}{4}}+C$

C) $x^{-\frac{4}{3}}+C$

D) $x^{\frac{2}{3}}+C$

E) $\frac{4}{3}x^{\frac{2}{3}}+C$

F) $\frac{3}{2}x^{\frac{2}{3}}+C$

G) $-\frac{3}{2}x^{\frac{3}{2}}+C$

H) $-\frac{2}{3}x^{-\frac{4}{3}}+C$

I) The function $x^{-1/3}$ is not continuous at $x = 0$ and so has no antiderivative.

J) None of the above.

13. Suppose f(x) and g(x) are integrable and that $\int_1^2 f(x)dx = -4$, $\int_1^5 f(x)dx = 6$ and $\int_1^5 g(x)dx = 8$. What is $\int_1^5 [4f(x) - g(x)]dx$?

A) -16

B) -8

C) -4

D) 0

E) 4

F) 8

G) 16

H) 32

I) Insufficient information to determine this.

J) None of the above.

14. Again, suppose f(x) and g(x) are integrable and that $\int_1^2 f(x)dx = -4$, $\int_1^5 f(x)dx = 6$ and $\int_1^5 g(x)dx = 8$. What is $\int_2^2 g(x)dx$?

A) -16

B) -8

C) -4

D) 0

E) 4

F) 8

G) 16

H) 32

I) Insufficient information to determine this.

J) None of the above.

15. Evaluate $\int_0^1 (x^2 + \sqrt{x})dx$.

A) 0

B) 3/16

C) 5/16

D) 1/3

E) 2/3

F) 7/8

G) 15/16

H) 1

I) 2

J) None of the above.

16. Evaluate $\int_0^{\pi} \sin x dx$.

A) 0

B) 3/16

C) 5/16

D) 1/3

E) 2/3

F) 7/8

G) 15/16

H) 1

I) 2

J) None of the above.

17. Find $\int x(1-x^2)^{1/4}\,dx$.

A) $\frac{1}{4}x(1-x)^{5/4}+C$

B) $\frac{1}{4}(1-x)^{-3/4}+C$

C) $\frac{1}{4}x(1-x^2)^{5/4}+C$

D) $\frac{1}{4}x(1-x^2)^{-3/4}+C$

E) $-\frac{2}{5}(1-x^2)^{5/4}+C$

F) $\frac{2}{5}(1-x^2)^{5/4}+C$

G) $\frac{2}{5}x(1-x^2)^{-3/4}+C$

H) $-\frac{2}{5}x(1-x^2)^{-3/4}+C$

I) $\frac{4}{3}(1-x^2)^{3/4}+C$

J) None of the above.

18. Find $\int x^2 \cos(x^3 - 2)dx$.

A) $2x\cos(x^3 - 2) + C$

B) $2x\sin(x^3 - 2) + C$

C) $x^2\cos(x^3 - 2) + C$

D) $x^2\sin(x^3 - 2) + C$

E) $\frac{1}{3}\sin(x^3 - 2) + C$

F) $\frac{1}{3}\cos(x^3 - 2) + C$

G) $\frac{1}{3}\sin(3x^2) + C$

H) $\frac{1}{3}\cos(3x^2) + C$

I) $3x\sin(3x^2) + C$

J) None of the above.

19. Evaluate $\int_0^1 t^3(1+t^4)^3\,dt$.

A) 0

B) 3/16

C) 5/16

D) 1/3

E) 2/3

F) 7/8

G) 15/16

H) 2

I) 32/3

J) None of the above.

20. Find the are enclosed by the curves $y = x^2 - 2$ and $y = 2$.

A) 0

B) 3/16

C) 5/16

D) 1/3

E) 2/3

F) 7/8

G) 15/16

H) 2

I) 32/3

J) None of the above.