

MAT 265 Final Exam Review Sections: cumulative

Please study Exam 1, 2, 3 and Mastery Exam Reviews.
Below is the material from 5.3 and 5.4 that is not covered on those reviews.

5.3

1. Find the exact value of the definite integral

$$\int_1^6 2^x dx.$$

2. Find the exact value of the definite integral $\int_3^{\sqrt{15}} \frac{10}{1+x^2} dx$

3. Find the exact value of the definite integral $\int_0^{\pi/4} \frac{3+\cos^3(x)}{\cos^2(x)} dx$

4. Evaluate the definite integral exactly. $\int_0^{\sqrt{3}/2} \frac{2}{\sqrt{1-x^2}} dx$

5. Evaluate the definite integral exactly: $\int_1^{e^5} \frac{2}{x} dx$

6. Evaluate the definite integral exactly: $\int_1^e (4e^x + 4 \sin x) dx$

7. The velocity of a particle moving along a horizontal line is given by $v(t) = t^2 - t - 6$ meters per second after t seconds. Find the **distance** traveled by the particle during the interval $1 \leq t \leq 5$.

8. Evaluate the indefinite integral: $\int \frac{5x^4 - 8x^2 + 3x - 2}{x^2} dx$

9. Evaluate the indefinite integral: $\int \sqrt{x}(x + 2) dx$

5.4

1. Differentiate $f(x) = \int_1^{2x} (\cos t - e^{4t} + 1) dt$

2. Find the derivative of $\int_{x^3}^3 \tan^{11}(t) dt$

3. Find the derivative of $\int_3^x \frac{1}{1+t^3} dt$

4. The linear density in a rod 3 meters long is $\frac{10}{1+x^2}$ kg/m, where x is measured in meters from one end of the rod. Find the average density (in kg/m) of the rod.

5. The temperature in degrees Fahrenheit t hours after 12 pm is modeled by

$$F(t) = 60 + 12\sin(t)$$

What is the average temperature, to 3 decimal places, from $t = 0$ to $t = \pi$?

6. A car drives down a road in such a way that its velocity (in m/s) at time t (seconds) is

$v(t) = 2t^{1/2} + 3$. Find the car's average velocity to three decimal places (in m/s) between $t = 2$ and $t = 4$.

Answers**5.3**

1. $\frac{2^6-2}{\ln 2}$
2. $10 \tan^{-1}(\sqrt{15}) - 10 \tan^{-1}(3)$
3. $3 + \frac{\sqrt{2}}{2}$
4. $\frac{2\pi}{3}$
5. 10
6. $4e^4 - 4 \cos(e) - 4e + 4\cos(1)$
7. 20 meters
8. $\frac{5x^3}{3} - 8x + 3 \ln(|x|) + \frac{2}{x} + C$
9. $\frac{2x^{5/2}}{5} + \frac{4x^{3/2}}{3} + C$

5.4

1. $f'(x) = 2(\cos(2x) - e^{8x} + 1)$
2. $-3x^2 \tan^{11}(x^3)$
3. $\frac{1}{1+t^3}$
4. $\frac{10}{3} \arctan(3) \cong 4.163 \text{ kg/m}$
5. 67.639
6. 6.448