

**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.  $4e^e - 4 \cos(e) - 4e + 4 \cos(1)$

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